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L1: Entry 8 of 8 File: DWPI Sep 26, 1995

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TITLE: Multilayer substrate mfg method for electronic device - involves formation of circuit pattern on both sides of metal foils by hardening of prepreg sheet

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PATENT-FAMILY:

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ABSTRACTED-PUB-NO: JP 07249868A
BASIC-ABSTRACT:

The mfg method involves formation of a prepreg sheet (1a,1b) on either sides of a circuit board (10) through a registration hole (3). A positioning pin (6) is set-up at a positioning plate. The positioning plate has a smaller dimension than the prepreg sheets and a circuit board.

The resin components of the prepreg sheet are stiffened by a heater chip (5), and bonding fixation at the circuit board is carried out. A metal foil (4) is arranged on either side of the external surface of the prepreg sheet. The heater chip is used to perform heating pressure of the whole surface. Then, circuit patterns (11a,11b,12a,12b) are formed on either side of the circuit board.

ADVANTAGE - Eliminates need for metal mould. Avoids deformation of positioning pin. Increases laminated accuracy. Provides superb multilayer substrate.

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L1: Entry 4 of 8 File: JPAB Sep 26, 1995

PUB-NO: JP407249868A
DOCUMENT-IDENTIFIER: JP 07249868 A
TITLE: MANUFACTURE OF MULTILAYER BOARD

PUBN-DATE: September 26, 1995

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INT-CL (IPC): H05 K 3/46

ABSTRACT:

PURPOSE: To prevent the molten resin component of a prepreg sheet from adhering to a positioning pin so as not to make it hard to dismount a circuit board by a method wherein an optional part of the prepreg sheet is cured by local heating to adhere to the circuit board and fixed, and a metal foil is pasted on both the sides of the circuit board and thermocompressed by a hot press.

CONSTITUTION: An aramide epoxy sheet 1b, a double-sided circuit board 10, and an aramide epoxy sheet 1a are laminated in this sequence inserting positioning pins 6 provided onto a positioning plate 7 into positioning holes 3 provided to them and pressed by a heater chip 5 heated to a temperature of 300 to 350°C to cure the resin components of the aramide epoxy sheets 1a and 1b to bond the sheets 1a and 1b to the double-sided circuit board 10. Then, the double-sided circuit board 10 is pulled out from the positioning pins 6, a metal foil 4 is made to overlap both the sides of the double-sided circuit board 10 and thermocompressed by a hot press to be bonded to the board 10, and circuit patterns 11a and 11b are connected to the metal foils 4 with conductive paste through an inner viahole. By this setup, a multilayer circuit board of this constitution is protected against, deformation caused by dismounting and kept high in lamination accuracy.

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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the manufacture approach of the multilayer substrate which comes to connect the circuit pattern of two or more layers.
[0002]
[Description of the Prior Art] In recent years, in connection with the miniaturization of electronic equipment, and densification, it does not remain in industrial use but a multilayer substrate has come to be strongly demanded also in a noncommercial field.
[0003] In order that detailed-ization of a circuit pattern may progress and, especially as for the densification of a multilayer substrate, the laminating precision between the circuit patterns of a layer may influence two or more the engine performance more, laminating precision and coincidence are expected the laminating approach that productivity is high.
[0004] The conventional multilayer substrate and here explain the manufacture approach of a four-layer substrate below. First, the manufacture approach of the double-sided circuit board used as the base of a multilayer substrate is explained. Drawing 8 (a) - (f) is the process sectional view of the manufacture approach of the conventional double-sided circuit board.
[0005] 1 is 250mm angle and a prepreg sheet with a thickness of about 150 micrometers, for example, the base material (an aramid-epoxy sheet is called below) which consists of composite which infiltrated the thermosetting epoxy resin into the aromatic polyamide fiber of a nonwoven fabric is used.
[0006] 32 is a sheet plastic with a thickness of about 10 micrometers which applied the release agent of Si system to one side, for example, polyethylene terephthalate (a PET sheet is called below) is used. 33 is a through tube and it fills up with the conductive paste 2 which sticks on both sides of the aramid-epoxy sheet 1, and connects with the metallic foils 4, such as 35-micrometer Cu, electrically in ** attachment ****.
[0007] First, as shown in drawing 8 (b), a through tube 33 is formed in the predetermined part of the aramid-epoxy sheet 1 (drawing 8 (a)) which the PET sheet 32 pasted up on both sides using a laser process etc.
[0008] Next, as shown in drawing 8 (c), a through tube 33 is filled up with the conductive paste 2. As an approach filled up with the conductive paste 2, the aramid-epoxy sheet 1 which has a through tube 33 is installed on the table of a printing machine (not shown), and the direct conductivity paste 2 is printed from the PET sheet 32.
[0009] At this time, the PET sheet 32 on top has played the role of a printing mask, and the role of the pollution control of the front face of the aramid-epoxy sheet 1.
[0010] Next, as shown in drawing 8 (d), the PET sheet 32 is exfoliated from both sides of the aramid-epoxy sheet 1.
[0011] And as shown in drawing 8 (e), the metallic foils 4, such as Cu, are put on both sides of the aramid-epoxy sheet 1. by carrying out heating pressurization with a heat press in this condition, the thickness of the aramid-epoxy sheet 1 compresses to be shown in drawing 8 (f) -- having (t2 = about 100

micrometers) -- the aramid-epoxy sheet 1 and a metallic foil 4 paste up, and the double-sided metallic foil 4 is electrically connected by the conductive paste 2 with which the through tube 33 prepared in the predetermined location was filled up.
[0012] And the double-sided metallic foil 4 is etched alternatively, a circuit pattern is formed (not shown), and the ****** circuit board is obtained.
[0013] Drawing 9 (a) - (d) shows as an example those with a process sectional view and the four-layer substrate in which the manufacture approach of the conventional multilayer substrate is shown.
[0014] As first shown in drawing 9 (a), the double-sided circuit board 10 which has the circuit patterns 11a and 12b manufactured by drawing 8 (a) - (f), and the aramid-epoxy sheets 1a and 1b (these sheets 1a and 1b are manufactured according to the process of (a) - (d) of drawing 8) which filled up the through tube with conductive paste 2 are prepared.
[0015] And it puts on the gage pin 46 prepared in the laminating metal mold 47 through tooling holes 3 in order of a metallic foil 4, aramid-epoxy sheet 1b, the double-sided circuit board 10, prepreg sheet 1a, and a metallic foil 4.
[0016] next, by carrying out heating pressurization with a heat press, where the upper metal mold 48 is carried, as shown in drawing 9 (b), as shown in drawing 9 (c), thickness of the aramid-epoxy sheets 1a and 1b is compressed (t2 = about 100 micrometers), and the double-sided circuit board 10 and a metallic foil 4 paste up -- inner beer hall connection of both the circuit patterns 11a and 11b is made with a metallic foil 4 with the conductive paste 2.
[0017] And as shown in drawing 9 (d), a four-layer substrate is obtained by alternatively the double-sided metallic foil 4, and forming the circuit patterns 12a and 12b.
[0018] Generally the process of the heating pressurization by the heat press is a batch type, and the setting time of the prepreg sheet used for the circuit board turns into 1-3Hr and long duration. Therefore, in order to raise productivity, while making [many] the number of processing of the circuit board in one press, it becomes important to attain the increase in efficiency of the workability before and behind a press.
[0019]
[Problem(s) to be Solved by the Invention] However, it sets to the manufacture approach of the above-mentioned conventional multilayer substrate. In order to make the gage pin of metal mold 1st pass the tooling holes of the small circuit board of path clearance, or a prepreg sheet since the metal mold which prepared the gage pin is needed, to position and to carry out a laminating, There were the resinous principle of the prepreg sheet which melted at the time of heating pressurization pasting up with a gage pin, it becoming difficult for the circuit board to remove it, and working efficiency's falling, and a problem of having made a gage pin transforming at the time of removal, and reducing laminating precision at it.
[0020] Although, as for metal mold, the thing of about 10mm of board thickness was used with the metal mold for precision reservation of a gage pin (for example, 300mm angle), while the number of processing of the circuit board for thickness of up-and-down metal mold becoming fewer and the weight of metal mold were also set to about 15kg and workability fell, there was [2nd] a problem that enlargement of substrate size was difficult.
[0021] This invention solves the above-mentioned conventional technical problem, and laminating precision is high and it aims at offering the manufacture approach of the multilayer substrate for realizing the multilayer substrate excellent in productivity.
[0022]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, after the manufacture approach of the multilayer substrate of this invention positions the circuit board and a prepreg sheet, carries out heat hardening of the part of the arbitration of superposition and a prepreg sheet partially and carries out adhesion immobilization with the circuit board, it tends to carry out heating pressurization of the metallic foil with lamination and a heat press to both sides of said circuit board, and tends to obtain a multilayer substrate.
[0023] Moreover, the circuit board and a prepreg sheet are positioned similarly, and superposition and

after pinching by the metallic foil further, carrying out heat hardening of the part of the arbitration of a prepreg sheet partially and carrying out adhesion immobilization of the circuit board and the metallic foil at coincidence, heating pressurization tends to be carried out with a heat press, and it is going to obtain a multilayer substrate.

[0024] After positioning similarly using further two or more circuit boards and prepreg sheets, carrying out heat hardening of the part of the arbitration of superposition and a prepreg sheet partially and carrying out adhesion immobilization with the circuit board, to both sides of said circuit board, heating pressurization tends to be carried out, a metallic foil tends to be put in block with lamination and a heat press, and it is going to obtain a multilayer substrate.

[0025]

[Function] According to this invention constituted as mentioned above, heating pressurization of the part of the arbitration of the positioned prepreg sheet is carried out, since it pastes up and fixes to the circuit board, metal mold becomes unnecessary at the time of a press, and problems, such as badness of the removal nature of the circuit board peculiar to metal mold use and deformation of a gage pin, are lost. Moreover, while the number of processing of the circuit board equivalent to the thickness of metal mold increases and productivity improves, since lightweight-ization can be attained, it becomes easy [the correspondence to enlargement of substrate size]. Moreover, a gap of the metallic foil at the time of a heat press, the circuit board, and a prepreg sheet can be prevented by partial hardening of a prepreg sheet, and a highly precise multilayer substrate can be realized.

[0026]

[Example] The manufacture approach of the multilayer substrate in one example of this invention is explained below.

[0027] (Example 1) About the manufacture approach of the double-sided circuit board used as the base of a multilayer substrate, it is the same as that of the conventional example, and explanation is omitted here.

[0028] Drawing 1 (a) - (f) shows as an example those with a process sectional view and the four-layer substrate in which the manufacture approach of the multilayer substrate of the 1st example of this invention is shown.

[0029] In drawing 1 , 1a and 1b are aramid-epoxy sheets (prepreg sheet) which consist of composite which infiltrated the thermosetting epoxy resin into 250mm angle and the aromatic polyamide fiber of a nonwoven fabric with a thickness of about 150 micrometers, and have filled up with conductive paste 2 the through tube processed with laser etc.

[0030] the conductive paste 2 with which the through tube which formed the circuit patterns 11a and 11b which 10 is 250mm angle and the double-sided circuit board with a thickness of about 170 micrometers, and were formed in both sides in the predetermined location was filled up -- therefore, it has connected electrically. Moreover, in 40, as at least jointing with the aramid-epoxy sheets 1a and 1b is shown in drawing 2 (a) and (b), as for the circuit patterns 11a and 11b of the double-sided circuit board 10, the metallic foil 4 is removed.

[0031] The conductive paste used at this time is fully kneaded with 3 rolls so that it may become a heat-curing mold epoxy resin (non-solvent mold) as resin and it may become 85 % of the weight, 12.5 % of the weight, and 2.5 % of the weight about the curing agent of an acid-anhydride system as a curing agent, respectively, using Ag powder with a mean particle diameter of 2 microns as a conductive filler.

[0032] The phi3mm tooling holes 3 have prepared in the aramid-epoxy sheets 1a and 1b and the double-sided circuit board 10 in two 180mm pitches at the position.

[0033] 5 is a heater chip whose tip is phi5mm, and seven are the positioning plate of 200mm angle which has arranged thephi2.97mm locator pin 6 in 180mm pitch.

[0034] Moreover, the depression is established so that the conductive paste 2 with which the through tube of the aramid-epoxy sheets 1a and 1b was filled up may not adhere to the positioning plate 7. 8 is a depression like jointing when carrying out heat hardening of the aramid-epoxy sheets 1a and 1b to the double-sided circuit board 10, and pasting up.

[0035] As first shown in drawing 1 (a), the aramid-epoxy sheets 1a and 1b manufactured by the double-

sided circuit board 10 which has the circuit patterns 11a and 11b manufactured by - (f), and drawing 9 (a) drawing 5 (a) - (d) are prepared.
[0036] And it puts on the gage pin 6 prepared in the positioning plate 7 through tooling holes 3 in order of aramid-epoxy sheet 1b, double-sided circuit board 10, and aramid-epoxy sheet 1a. At this time, the neighborhood of the aramid-epoxy sheets 1a and 1b and the double-sided circuit board 10 is in the condition of having overflowed the positioning plate 7 every 25mm.
[0037] Next, as shown in drawing 1 (b), it sets to the position of the aramid-epoxy sheets 1a and 1b which pinched the double-sided circuit board 10 protruded from the positioning plate 7. The resinous principle of for 10 seconds, in addition the aramid-epoxy sheets 1a and 1b is stiffened for the pressure of about 500g with the heater chip 6 heated at 300-350 degrees C whose tips prepared up and down are phi5mm, and it pastes up with the double-sided circuit board 10.
[0038] Although at least two adhesion parts in this adhesion were required in order to hold the positioning accuracy at the time of a laminating, they were made into four angles, each four midpoints, and a total of eight places in the example.
[0039] About 50-micrometer depression 8 is formed in jointing in the condition of having separated the heater chip 6 from the aramid-epoxy sheets 1a and 1b.
[0040] Although the tip configuration of the heater chip 5 used the thing of a circle configuration here, they may be a rectangle, an ellipse, etc. and is not limited especially.
[0041] Here, although considered as the circuit patterns 11a and 11b from which the metallic foil 4 like jointing of the double-sided circuit board 10 was removed, when the metallic foil 4 remains at least in jointing of the double-sided circuit board 10, since heat capacity changes with the amount of survival, heating conditions are changed.
[0042] For example, when remaining in the whole surface, the time amount for 20 seconds or more is needed also on the above-mentioned heating conditions. That is, although heating conditions will be set up with the amount of survival of the metallic foil 4 like jointing, by removing the metallic foil 4 like jointing altogether, it is stabilized on certain adhesion conditions and adhesion is possible.
[0043] Moreover, when the relation of the pressure and adhesive strength which are applied to a heater chip at this time was investigated, by the two or less 4 g/cm pressure, it separated at the time of after [immobilization] conveyance, and was a manufacture top problem. It is still more desirable if it can convey satisfactory if it is a two or more 5 g/cm pressure, and it is two or more 10 g/cm.
[0044] Moreover, although temperature changes with resinous principles of the prepreg sheet to be used, the melting temperature is around 100 degrees C, and the main point of the invention in this application shows that it is satisfactory, if the resin (epoxy resin) generally used for the circuit board is 150 degrees C or more which is the temperature to which hardening progresses. However, the range of 250 to 350 degrees C is desirably the optimal from a viewpoint of the processing time.
[0045] As shown in drawing 1 (c), to both sides Next, aramid-epoxy sheet 1a, The double-sided circuit board 10 which pasted up 1b and was fixed is sampled from the gage pin 6 of the positioning plate 7. After putting a metallic foil 4 on both sides, when the whole surface is carried out with a heat press and 50 kg/cm2 and temperature carry out [a pressure] heating pressurization of the 1 hour at 200 degrees C While the thickness of the aramid-epoxy sheets 1a and 1b compresses to be shown in drawing 1 (e) (t2 = about 100 micrometers), aramid-epoxy sheet 1a, Pasting up the double-sided circuit board 10 and a metallic foil 4 by 1b, the circuit patterns 11a and 11b make inner beer hall connection with a metallic foil 4 with the conductive paste 34.
[0046] And as shown in drawing 1 (f), the double-sided metallic foil 4 is etched alternatively, a circuit pattern is formed, and a four-layer substrate is obtained.
[0047] What is necessary is to use the multilayer substrate manufactured by the above-mentioned manufacturing method instead of the double-sided circuit board, and just to repeat the same process, if it is going to obtain the multilayer substrate of four or more layers.
[0048] That is, as shown in drawing 1 (a), an aramid-epoxy sheet is positioned and put on both sides of a multilayer substrate. As shown in drawing 1 (b), after carrying out heat hardening of the position of an aramid-epoxy sheet partially and pasting up, The multilayer substrate on which said aramid-epoxy sheet

was pasted up partially in the location of arbitration is sampled from the gage pin of a positioning plate like drawing 1 (c). After carrying out heating pressurization with a heat press, and making inner beer hall connection of the circuit pattern and metallic foil of a multilayer substrate with a conductive paste while pasting up a metallic foil and a multilayer substrate with an aramid-epoxy sheet as a metallic foil is stuck on the outermost side like drawing 1 (d) and it is shown in drawing 1 (e), A multilayer substrate is obtained by repeating the process which processes a metallic foil and forms a circuit pattern as shown in drawing 1 (f).

[0049] Adhesion immobilization with the gage pin by the influx to the fused adhesives tooling holes which are the characteristic problems at the time of metal mold use is lost, any trouble cannot be found, and it came to be able to perform an ejection activity because metal mold became unnecessary in the manufacture process.

[0050] And since the gage pin in this example performed extraction and insertion to a gage pin at a room temperature only for the purpose of positioning, deformation of it by removal to which melting fixing of the adhesives component of a prepreg sheet becomes a cause was able to be lost, and it was able to maintain a stable laminating precision.

[0051] Moreover, while being able to increase and press the number of substrates of a metal mold Health and Welfare Minister this (they are about four sheets with a four-layer substrate), lightweight-ization could be attained and it became possible to correspond also to enlargement of substrate size easily. The laminating precision of the four-layer substrate of the completed example 1 is having used the gage pin for positioning of the double-sided circuit board and a prepreg sheet, and a laminating precision (100 micrometers or less) equivalent to the case where the metal mold of the conventional example is used was acquired.

[0052] (Example 2) Drawing 3 (a) - (f) shows as an example those with a process sectional view and the four-layer substrate in which the manufacture approach of the multilayer substrate of the 2nd example of this invention is shown.

[0053] In drawing 3 , 1a and 1b are glass-epoxy sheets (prepreg sheet) which consist of composite which infiltrated the thermosetting epoxy resin into 250mm angle and glass fabrics with a thickness of about 150 micrometers. Although the raw glass-epoxy sheet was used here, the glass-epoxy sheets 1a and 1b which filled up with conductive paste the through tube processed with laser etc. may be used.

[0054] the conductive paste 2 with which the through tube which formed the circuit patterns 11a and 11b which 10 is 250mm angle and the double-sided circuit board with a thickness of about 170 micrometers, and were formed in both sides in the predetermined location was filled up -- therefore, it has connected electrically.

[0055] Although the double-sided circuit board 10 which connected between layers with conductive paste 2 was used here, the double-sided (not shown) circuit board 10 which connected with the metal which carried out hole processing with the drill between layers, and deposited in electroplating may be used.

[0056] The conductive paste 2 used at this time is fully kneaded with 3 rolls so that it may become a heat-curing mold epoxy resin (non-solvent mold) as resin and it may become 85 % of the weight, 12.5 % of the weight, and 2.5 % of the weight about the curing agent of an acid-anhydride system as a curing agent, respectively, using Cu powder with a mean particle diameter of 2 microns as a conductive filler.

[0057] 4 is metallic foils, such as Cu with a 300mm angle and a thickness of 35 micrometers, and 5 is a heater chip whose tip is phi5mm.

[0058] As first shown in drawing 3 (a), on the activity stage 51, it positions externally in order of a metallic foil 4, glass-epoxy sheet 1b, the double-sided circuit board 10, glass-epoxy sheet 1a, and a metallic foil 4, and piles up. At this time, the neighborhood of the glass-epoxy sheets 1a and 1b and the double-sided circuit board 10 is in the condition of having overflowed the activity stage 51 every 25mm.

[0059] Next, as shown in drawing 3 (b), the metallic foil 4 which has arranged the position of the glass-epoxy sheets 1a and 1b which pinched the double-sided circuit board 10 overflowing from the activity stage 51 to the outermost side is minded. The pressure of about 500g is applied for 20 seconds with the

heater chip 6 heated at 300-350 degrees C whose tips prepared up and down are phi5mm, the resinous principle of the glass-epoxy sheets 1a and 1b is stiffened, and it pastes up with the double-sided circuit board 10.

[0060] In this case, although at least two adhesion parts were required in order to hold the positioning accuracy at the time of a laminating, in the example, they could be four angles, each four midpoints, and a total of eight places.

[0061] In the condition of having separated the heater chip 6 from the glass-epoxy sheets 1a and 1b, some deformation (not shown) arose in the metallic foil 4 like jointing. By pasting up a metallic foil 4 on coincidence, compaction of the setting time at the time of a press and dust adhesion on the glass-epoxy sheets 1a and 1b can be prevented.

[0062] Static electricity is charged, and dust tends to adhere and it is hard to remove especially the glass-epoxy sheets 1a and 1b. It will be easy to remove even if dust adheres to a metallic foil 4, while preventing the invasion of dust to glass-epoxy sheet 1a and the interior of 1b by pasting up a metallic foil 4.

[0063] Next, when the double-sided circuit board 10 which pasted up the glass-epoxy sheets 1a and 1b on both sides, and was fixed to them is taken out from the activity stage 51, a pressure carries out with a heat press and 50 kg/cm2 and temperature carry out complete heating pressurization at 200 degrees C for 1 hour While the thickness of the glass-epoxy sheets 1a and 1b compresses to be shown in drawing 3 (c) (t2 = about 140 micrometers), the double-sided circuit board 10 and a metallic foil 4 are pasted up with the glass-epoxy sheets 1a and 1b.

[0064] subsequently, it is shown in drawing 3 (d) -- as -- the specified location of the double-sided circuit board 10 -- an abbreviation phi0.4mm drill -- using -- the hole of SURUHORU 60 -- after processing it, as shown in drawing 3 (e), activation on the front face of a substrate is performed, and metals, such as Cu, are carried out deposit 64 all over a substrate in electroplating.

[0065] If the thickness of said deposit metal 64 is 20 micrometers or more at this time, the dependability of SURUHORU connection will be acquired.

[0066] Subsequently, as shown in drawing 3 (f), the deposit metal and metallic foil 4 in the outermost side of the multilayered substrate are alternatively etched into coincidence, plating SURUHORU 61 which connects electrically between formation of the circuit patterns 12a and 12b, between the outermost layers of the multilayered substrate and the outermost layer, and a inner layer etc. is formed, and a four-layer substrate is obtained.

[0067] What is necessary is to use the multilayer substrate manufactured by the above-mentioned manufacturing method instead of the double-sided circuit board, and just to repeat the same process, if it is going to obtain the multilayer substrate of four or more layers.

[0068] That is, as shown in drawing 3 (a), a glass-epoxy sheet and a metallic foil are positioned and put on both sides of a multilayer substrate on an activity stage. As shown in drawing 3 (b), after carrying out heat hardening of the position of a glass-epoxy sheet partially and pasting up, As shown in drawing 3 (c), carry out heating pressurization of the whole substrate surface with a heat press, and a metallic foil and a multilayer substrate are pasted up with a glass-epoxy sheet. As shown in drawing 3 (d), a drill performs SURUHORU hole processing in the specified location of a multilayer substrate. As shown in drawing 3 (e), after depositing metals, such as Cu, all over a multilayer substrate, a multilayer substrate is obtained by repeating the process which processes the deposit metal and metallic foil of the outermost side into coincidence, and forms a circuit pattern and plating SURUHORU as shown in drawing 3 (f). The same effectiveness as an example 1 is acquired also in the example 2.

[0069] (Example 3) Drawing 4 (a) - (c) shows as an example those with a process sectional view and the four-layer substrate in which the manufacture approach of the multilayer substrate of the 3rd example of this invention is shown.

[0070] In drawing 4 , 1a and 1b are aramid-epoxy sheets (prepreg sheet) which consist of composite which infiltrated the thermosetting epoxy resin into 250mm angle and the aromatic polyamide fiber of a nonwoven fabric with a thickness of about 150 micrometers, and have filled up with conductive paste 2 the through tube processed by laser etc.

[0071] The conductive paste used at this time is fully kneaded with 3 rolls so that it may become a heat-curing mold epoxy resin (non-solvent mold) as resin and it may become 87.5 % of the weight, 10 % of the weight, and 2.5 % of the weight about the curing agent of an acid-anhydride system as a curing agent, respectively, using Cu powder with a mean particle diameter of 2 microns as a conductive filler.
[0072] the conductive paste 2 with which the through tube which prepared circuit pattern 21a which 20a, 20b, and 20c are 250mm angle and the double-sided circuit board with a thickness of about 170 micrometers, and was formed in both sides, 21b and 22a, and 22b, 23a and 23b in the predetermined location was filled up -- therefore, it has connected electrically.
[0073] The phi3mm tooling holes 3 have prepared in the aramid-epoxy sheets 1a and 1b and the double-sided circuit boards 20a, 20b, and 20c in two 180-micrometer pitches. 5 is a heater chip whose tip is phi5mm.
[0074] As first shown in drawing 4 (a), it sticks to the activity stage 51 on the adsorption pressurization plate 70 in order of double-sided circuit board 20c, aramid-epoxy sheet 1b, double-sided circuit board 20b, aramid-epoxy sheet 1a, and double-sided circuit board 20a, and positions and piles up according to image recognition etc. using circuit pattern 21a, 21b and 22a, and 22b, 23a and 23b.
[0075] At this time, the aramid-epoxy sheets 1a and 1b, the double-sided circuit boards 20a and 20b, and the 20c neighborhood 4 are in the condition of having overflowed the activity stage 51 every 25mm.
[0076] Next, from on double-sided circuit board 20a, as shown in drawing 4 (b), where the double-sided circuit boards 20a, 20b, and 20c and the aramid-epoxy sheets 1a and 1b are pressurized by about 20 g/cm2 on the adsorption pressurization plate 70 Double-sided circuit board 20a which pinched the flash aramid-epoxy sheet 1 from the activity stage 51, The pressure of about 500g is applied for 20 seconds with the heater chip 6 which heated at least jointing of 20c at 300-350 degrees C, the resinous principle of the aramid-epoxy sheets 1a and 1b is stiffened, and it pastes up with the double-sided circuit boards 20a, 20b, and 20c. The adhesion part was performed like the example 1 by four angles, each four midpoints, and a total of eight places.
[0077] While improving adhesion with the aramid-epoxy sheets 1a and 1b and the double-sided circuit boards 20a, 20b, and 20c and stabilizing positioning by pressurizing on the adsorption pressurization plate 70, the location gap generated by melting of an epoxy resin at the time of adhesion can be prevented.
[0078] If the heater chip 5 is separated from the double-sided circuit boards 20a and 20c, as for jointing of the double-sided circuit boards 20a and 20c, deformation will be seen slightly.
[0079] Next, double-sided circuit board 20a pasted up and fixed by aramid-epoxy C 1a and 1b, When 20b and 20c are taken out from the activity stage 51, a pressure carries out with a heat press and 50 kg/cm2 and temperature carry out heating pressurization of the whole surface at 200 degrees C for 1 hour it is shown in drawing 4 (c) -- as -- the thickness of the aramid-epoxy sheets 1a and 1b -- compressing (t2 = about 100 micrometers) -- aramid-epoxy sheet 1a -- 1b pastes up the double-sided circuit boards 20a, 20b, and 20c and a metallic foil 4. The six-layer substrate circuit pattern 23a of circuit pattern 22b and double-sided circuit board 20c of circuit pattern 22a of circuit pattern 21b of double-sided circuit board 20a and double-sided circuit board 20b and double-sided circuit board 20b made [the substrate] inner beer hall connection with the conductive paste 2 is obtained.
[0080] Although the six-layer substrate was explained to the example here In the case of the substrate of six or more layers, the double-sided circuit board and the prepreg sheet according to a number of layers are prepared. A prepreg sheet is positioned and piled up so that the circuit board may become the outermost layer (drawing 4 (a)). After pasting up the circuit board and a prepreg sheet partially by the part of arbitration (drawing 4 (b)), Carry out heating pressurization of the whole surface with a heat press, and while pasting up a metallic foil and the double-sided circuit board with a prepreg sheet, inner beer hall connection of the circuit pattern and metallic foil of a multilayer substrate is made with a conductive paste. It bundles up by processing a metallic foil and forming a circuit pattern, as shown in drawing 4 (d), and a multilayer substrate is obtained. The same effectiveness as an example 1 is acquired also in the example 3.
[0081] (Example 4) Drawing 5 (a) - (f) shows as an example those with a process sectional view and the

six-layer substrate in which the manufacture approach of the multilayer substrate of the 4th example of this invention is shown.

[0082] In drawing 5 , 1a, 1b, and 1c are aramid-epoxy sheets (prepreg sheet) which consist of composite which infiltrated the thermosetting epoxy resin into 250mm angle and the aromatic polyamide fiber of a nonwoven fabric with a thickness of about 150 micrometers, and are filled up with the conductive paste 2 which becomes the through tube processed by laser etc. from Cu powder and a heat-curing mold epoxy resin.

[0083] the conductive paste 2 with which the through tube which prepared circuit pattern 21a which 20a and 20b are the 1st and 2nd double-sided circuit board with a 250mm angle and a thickness of about 170 micrometers, and was formed in both sides, and 21b, 22a and 22b in the predetermined location was filled up -- therefore, it has connected electrically.

[0084] Furthermore, the phi3mm tooling holes 3 have formed the openings 65a and 65b to which a tip can pass the heater chip 5 of 5phimm in 180-micrometer pitch at the aramid-epoxy sheets 1a, 1b, and 1c and the double-sided circuit boards 20a and 20b using laser, a drill, punch, etc. at least in jointing of two pieces and the layer which the prepreg sheets 1a, 1b, and 1c specified as the double-sided circuit boards 20a and 20b.

[0085] It is for carrying out sequential adhesion for every number of layers which can paste up the prepreg sheets 1a, 1b, and 1c and the double-sided circuit boards 20a and 20b on certain heating conditions, and as shown in drawing 6 , it cuts, and it may lack and Openings 65a and 65b may form Openings 65a and 65b.

[0086] 57 is the positioning plate of 200mm angle which has arranged thephi2.97mm locator pin 6 in 180mm pitch.

[0087] As first shown in drawing 5 (a), it puts on the gage pin 6 prepared in the positioning plate 7 through tooling holes 3 in order of aramid-epoxy sheet 1c, double-sided circuit board 20b, aramid-epoxy sheet 1b, double-sided circuit board 20a, and aramid-epoxy sheet 1a. At this time, the neighborhood 4 of the aramid-epoxy sheets 1a, 1b, and 1c and the double-sided circuit boards 20a and 20b is in the condition of having overflowed the positioning plate 7 every 25mm.

[0088] As shown in drawing 5 (b), to next, opening 65b prepared in aramid-epoxy sheet 1c and double-sided circuit board 20b which were protruded from the positioning plate 7 The heater chip 6 heated at 300-350 degrees C is passed, the pressure of about 500g is applied for the aramid-epoxy sheets 1a and 1b which pinch double-sided circuit board 20a for 10 seconds, the resinous principle of the aramid-epoxy sheets 1a and 1b is stiffened, and it pastes up with double-sided circuit board 20a.

[0089] As shown in drawing 5 (c), to next, opening 65a prepared in aramid-epoxy sheet 1a and double-sided circuit board 20a which were protruded from the positioning plate 7 The heater chip 6 heated at 300-350 degrees C is passed, the pressure of about 500g is applied for the aramid-epoxy sheets 1b and 1c which pinch double-sided circuit board 20b for 10 seconds, the resinous principle of the aramid-epoxy sheets 1b and 1c is stiffened, and it pastes up with double-sided circuit board 20b.

[0090] Here, package adhesion may be performed as the aramid-epoxy sheets 1a, 1b, and 1c and the double-sided circuit boards 20a and 20b are shown in examples 1, 2, and 3, although sequential adhesion was performed for every layer.

[0091] The adhesion part in drawing 5 (b) and (c) was performed like the example 1 by four angles, each four midpoints, and a total of eight places.

[0092] Next, after sampling the double-sided circuit boards 20a and 20b pasted up and fixed with the middle aramid-epoxy sheets 1a, 1b, and 1c from the gage pin 6 of the positioning plate 7, as they are shown in drawing 5 (d) When a metallic foil 4 is stuck on the outermost side, a pressure carries out with a heat press and 50 kg/cm2 and temperature carry out heating pressurization of the whole substrate surface at 200 degrees C for 1 hour it is shown in drawing 5 (e) -- as -- the thickness of the aramid-epoxy sheets 1a, 1b, and 1c -- compressing (t2 = about 100 micrometers) -- The aramid-epoxy sheets 1a, 1b, and 1c Double-sided circuit board 20a, While pasting up 20b and a metallic foil 4 Inner beer hall connection is made with the conductive paste 2 between circuit pattern 22a of circuit pattern 21of double-sided circuit board 20b b, and double-sided circuit board 20b, and between circuit pattern 22b

and the metallic foils 4 of circuit pattern 21a and circuit board 20b of circuit board 20a.
[0093] Next, as shown in drawing 5 (f), it bundles up by etching the double-sided metallic foil 4 alternatively, and forming the circuit patterns 23a and 23b, and a six-layer substrate is obtained.
[0094] Although the six-layer substrate was explained to the example here In the case of the substrate of six or more layers, the double-sided circuit board and the prepreg sheet according to a number of layers are prepared. It positions and piles up so that a prepreg sheet may serve as the outermost layer (drawing 5 (a)). every number of layers which can be pasted up on certain heating conditions -- the double-sided circuit board and a prepreg sheet -- sequential adhesion -- carrying out (drawing 5 (b) --) (c) -- a metallic foil after lamination (drawing 5 (d)) **** to the outermost side As shown in drawing 5 (e), while carrying out heating pressurization of the whole substrate surface with a heat press and pasting up a metallic foil and a multilayer substrate with an aramid-epoxy sheet, inner beer hall connection of the circuit pattern and metallic foil of a multilayer substrate is made with a conductive paste. It bundles up by processing a metallic foil and forming a circuit pattern, as shown in drawing 5 (f), and a multilayer substrate is obtained.
[0095] The effectiveness as an example 1 that this example is also the same is acquired.
(Example 5) Drawing 7 (a) - (d) shows as an example those with a process sectional view and the six-layer substrate in which the manufacture approach of the multilayer substrate of the 5th example of this invention is shown.
[0096] In drawing 7 , 1a, 1b, and 1c are aramid-epoxy sheets (prepreg sheet) which consist of composite which infiltrated the thermosetting epoxy resin into 250mm angle and the glass cloth with a thickness of about 150 micrometers, and are filled up with the conductive paste 2 which becomes the through tube processed by laser etc. from Cu powder and a heat-curing mold epoxy resin.
[0097] the conductive paste 2 with which the through tube which prepared circuit pattern 21a which 20a and 20b are 250mm angle and the double-sided circuit board with a thickness of about 170 micrometers, and was formed in both sides, and 21b, 22a and 22b in the predetermined location was filled up -- therefore, it has connected electrically.
[0098] 4 is metallic foils, such as Cu with a 300mm angle and a thickness of 35 micrometers, and 5 is a heater chip whose tip is phi5mm.
[0099] As first shown in drawing 7 (a), on the activity stage 51 A metallic foil 4, aramid-epoxy sheet 1c, It adsorbs on the adsorption pressurization plate 70 in order of double-sided circuit board 20b, aramid-epoxy sheet 1b, double-sided circuit board 20b, aramid-epoxy sheet 1a, and a metallic foil 4, and a metallic foil 4 is an appearance. The aramid-epoxy sheets 1a, 1b, and 1c and the double-sided circuit boards 20a and 20b are positioned and piled up according to image recognition etc. using the positioning pattern 66 prepared in the circuit boards 20a and 20b.
[0100] At this time, the neighborhood 4 of the aramid-epoxy sheets 1a, 1b, and 1c and the double-sided circuit boards 20a and 20b is in the condition of having overflowed the positioning plate 7 every 25mm.
[0101] As shown in drawing 7 (b), on the adsorption pressurization plate 70 from on a metallic foil 4 Next, double-sided circuit board 20a, Aramid-epoxy sheet 1a protruded from the activity stage 51 after 20b and the aramid-epoxy sheets 1a, 1b, and 1c had pressurized by about 20 g/cm2, At least jointing of 1b, 1c, and the double-sided circuit boards 20a and 20b from the metallic foil 4 of the outermost side The pressure of about 500g is applied for 20 seconds with the heater chip 6 heated at 300-350 degrees C, the resinous principle of the aramid-epoxy sheets 1a, 1b, and 1c is stiffened, and it pastes up with the double-sided circuit boards 20a and 20b and a metallic foil 4.
[0102] The adhesion part was performed like the example 1 by four angles, each four midpoints, and a total of eight places.
[0103] While improving adhesion with the aramid-epoxy sheets 1a, 1b, and 1c and the double-sided circuit boards 20a and 20b and stabilizing positioning by pressurizing on the adsorption pressurization plate 70, the location gap generated by melting of an epoxy resin at the time of adhesion can be prevented.
[0104] What is necessary is just to dent and establish them in the structure, for example, the plate side of the fixed range of a conductive paste 2 restoration part, avoid a conductive paste 2 restoration part, since

conductive paste 2 adheres to the adsorption pressurization plate 70 or the activity stage 51 and it may escape from the adsorption pressurization plate 70 and the activity stage 51 which are pressurized at this time on them, when the aramid-epoxy sheets 1a and 1c of the outermost layer are filled up with conductive paste 2 at penetration opening.

[0105] A flat plate may be used when a metallic foil 4 is in the outermost side, even if it fills up with the case where it does not fill up with conductive paste 2, or conductive paste 2 and is.

[0106] Moreover, what is necessary is just to add protection material, such as an elastic body, so that a blemish etc. may not be attached to the circuit patterns 21a, 21b, 22a, and 22b when the double-sided circuit boards 20a and 20b serve as the outermost side. Here, since the metallic foil 4 served as the outermost side, the adsorption pressurization plate 70 and the activity stage 51 used the flat thing.

[0107] Next, when a pressure carries out with a heat press and 50 kg/cm2 and temperature carry out heating pressurization at 200 degrees C for 1 hour it is shown in drawing 7 (c) -- as -- the thickness of the aramid-epoxy sheets 1a, 1b, and 1c -- compressing (t2 = about 100 micrometers) -- aramid-epoxy sheet 1a -- While 1b and 1c paste up the double-sided circuit boards 20a and 20b and a metallic foil 4 Inner beer hall connection is made with the conductive paste 2 between circuit pattern 22a of circuit pattern 21of double-sided circuit board 20b b, and double-sided circuit board 20b, between circuit pattern 21a and the metallic foils 4 of circuit board 20a, and between circuit pattern 22b and the metallic foils 4 of circuit board 20b.

[0108] Next, as shown in drawing 7 (d), it bundles up by etching the double-sided metallic foil 4 alternatively, and forming the circuit patterns 23a and 23b, and a six-layer substrate is obtained.

[0109] Although the six-layer substrate was explained to the example here In the case of the substrate of six or more layers, the double-sided circuit board and the prepreg sheet according to a number of layers are prepared. It positions and piles up so that a prepreg sheet may touch the metallic foil of the outermost side. The double-sided circuit board and a prepreg sheet are pasted up from on the metallic foil of (drawing 7 (a)) and both sides (drawing 7 (b)). As shown in drawing 7 (c), while carrying out heating pressurization of the whole substrate surface with a heat press and pasting up with a metallic foil and a double-sided circuit board group with a prepreg sheet After making inner beer hall connection of between the circuit patterns of the double-sided circuit board and the double-sided circuit board, and the metallic foil with a conductive paste, it bundles up by processing a metallic foil and forming a circuit pattern, as shown in drawing 7 (d), and a multilayer substrate is obtained. The same effectiveness as an example 1 is acquired also in the example 5.

[0110] Since heat hardening of the prepreg sheet is carried out, it pastes up with the double-sided circuit board before a heat press and this invention becomes unnecessary [metal mold] as stated above, badness of removal nature, deformation of a gage pin, etc. which are a characteristic problem at the time of metal mold use can be abolished. Moreover, while being able to increase and press the number of substrates of metal mold thickness, lightweight-ization of weight can be attained and it can respond also to enlargement of substrate size easily.

[0111] Furthermore, a gap of the metallic foil at the time of a heat press, the circuit board, and a prepreg sheet can be prevented by partial hardening of a prepreg sheet, and a highly precise multilayer substrate can be realized.

[0112] In addition, although the prepreg sheet (glass epoxy sheet) into which thermosetting resin was infiltrated was used for the textile fabrics which used as the principal member the prepreg sheet (aramid-epoxy sheet) which infiltrated thermosetting resin into the nonwoven fabric which used the organic material as the principal member, and the inorganic material in the example Although the heating heater was always used for the heating means in the example again even if it used the prepreg sheet into which thermosetting resin was infiltrated for the nonwoven fabric which used as the principal member the prepreg sheet which infiltrated thermosetting resin into the cloth which used the organic material as the principal member, and the inorganic material The same effectiveness is acquired even if it uses a pulse heater, and a supersonic wave and laser.

[0113]

[Effect of the Invention] as having state above, while metal mold become unnecessary, and badness of

removal nature, deformation of a gage pin, etc. which be a characteristic problem at the time of metal mold use be lose and being able to raise the number of substrates of metal mold thickness by carry out heat hardening of the prepreg sheet, and paste up with the double-sided circuit board before a heat press, lightweight-ization can attain, and the manufacture approach of a multilayer substrate excellent in productivity with the high laminating precision which can respond also to enlargement of substrate size easily offer.

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CLAIMS

[Claim(s)]
[Claim 1] The process which positions and pinches the prepreg sheet which has compressibility-ed to both sides of the circuit board which has a circuit pattern more than two-layer at least, The process which carries out heating pressurization partially, is made to harden the part of the arbitration of the prepreg sheet pinched to said both sides, and carries out adhesion immobilization at said circuit board, The process which furthermore allots a metallic foil to the outermost side of the prepreg sheet of said both sides which carried out adhesion immobilization partially, carries out heating pressurization of the whole surface, and performs adhesion of a metallic foil, and adhesion of the circuit board by hardening of a prepreg sheet, The manufacture approach of the multilayer substrate characterized by consisting of a process which processes said metallic foil and forms a circuit pattern in both sides.
[Claim 2] The process which positions and pinches the prepreg sheet which has compressibility-ed to both sides of the circuit board which has a circuit pattern more than two-layer at least, The process which furthermore pinches a metallic foil to the outermost layer both sides, and the process which carries out heating pressurization of the part of the arbitration of said metallic foil partially, is made to harden said prepreg sheet partially and carries out adhesion immobilization of said circuit board and metallic foil, The manufacture approach of the multilayer substrate characterized by consisting of a process which furthermore carries out heating pressurization of the whole surface, and performs adhesion of a metallic foil, and adhesion of the circuit board by hardening of a prepreg sheet, and a process which processes said metallic foil and forms a circuit pattern in both sides.
[Claim 3] The process which positions by turns and piles up two or more circuit boards which have a circuit pattern more than two-layer at least, and two or more prepreg sheets which have compressibility-ed so that said circuit board may be arranged at the outermost layer, The process which carries out heating pressurization of the part of the arbitration of said positioned circuit board group and a prepreg sheet group partially, is made to harden a prepreg sheet and carries out adhesion immobilization of said circuit board group and the prepreg sheet group, The manufacture approach of the multilayer substrate characterized by consisting of a process on which said prepreg sheet is stiffened by furthermore carrying out heating pressurization of the whole surface, and said circuit board group is pasted up.
[Claim 4] The process which positions by turns and piles up two or more circuit boards which have a circuit pattern more than two-layer at least, and two or more prepreg sheets which have compressibility-ed so that said prepreg sheet may be arranged at the outermost layer, The process which carries out heating pressurization of the part of the arbitration of said positioned circuit board group and a prepreg sheet group partially, is made to harden a prepreg sheet and carries out adhesion immobilization of said circuit board group and the prepreg sheet group, The manufacture approach of the multilayer substrate characterized by consisting of a process on which said prepreg sheet is stiffened by furthermore carrying out heating pressurization of the whole surface, and said circuit board group is pasted up.
[Claim 5] The process which positions by turns and piles up two or more circuit boards which have a circuit pattern more than two-layer at least, and two or more prepreg sheets which have compressibility-ed so that said prepreg sheet may be arranged at the outermost layer, The process which furthermore

pinches a metallic foil to the outermost layer both sides, and the process which carries out heating pressurization of the part of the arbitration of said metallic foil partially, and carries out adhesion immobilization of said circuit board group, prepreg sheet group, and metallic foil which were positioned by hardening of a prepreg sheet, The manufacture approach of the multilayer substrate characterized by consisting of a process which furthermore carries out heating pressurization of the whole surface, and performs adhesion of a metallic foil, and adhesion of a circuit board group by hardening of a prepreg sheet group, and a process which processes said metallic foil and forms a circuit pattern in both sides.
[Claim 6] the prepreg sheet which has compressibility-ed -- and -- or the manufacture approach of a multilayer substrate given in any of claims 1-5 characterized by being the composite of the textile fabrics or the nonwoven fabric with which the circuit board which has a circuit pattern more than two-layer at least makes an organic material the charge of a principal member, and thermosetting resin they are.
[Claim 7] the prepreg sheet which has compressibility-ed -- and -- or the manufacture approach of a multilayer substrate given in any of claims 1-5 characterized by being the composite of the textile fabrics or the nonwoven fabric with which the circuit board which has a circuit pattern more than two-layer at least makes aromatic polyamide the charge of a principal member, and a heat-curing mold epoxy resin they are.
[Claim 8] the prepreg sheet which has compressibility-ed -- and -- or the manufacture approach of a multilayer substrate given in any of claims 1-5 characterized by being the composite of the textile fabrics or the nonwoven fabric with which the circuit board which has a circuit pattern more than two-layer at least makes an inorganic material the charge of a principal member, and thermosetting resin they are.
[Claim 9] the prepreg sheet which has compressibility-ed -- and -- or the manufacture approach of a multilayer substrate given in any of claims 1-5 characterized by being the composite of the textile fabrics or the nonwoven fabric with which the circuit board which has a circuit pattern more than two-layer at least consists of a glass ingredient, and a heat-curing mold epoxy resin they are.
[Claim 10] The manufacture approach of a multilayer substrate given in any of claims 1-5 characterized by preparing a through tube at least in the specification part which connects with the prepreg sheet which has compressibility-ed with the circuit pattern of the circuit board, and conductive paste coming to be filled up they are.
[Claim 11] The manufacture approach of the multilayer substrate according to claim 10 characterized by the conductive material of a conductive paste consisting of powder of Cu, Ag, and these alloys.
[Claim 12] The manufacture approach of a multilayer substrate given in any of claims 1-5 characterized by the circuit board which has a circuit pattern more than two-layer at least being the circuit board by which the interlayer connection was made beforehand they are.
[Claim 13] The manufacture approach of a multilayer substrate given in any of claims 1-5 characterized by always using a heating heater, a pulse heater, a supersonic wave, or laser for the heating means which carries out heating pressurization of the part of arbitration partially they are.
[Claim 14] The manufacture approach of a multilayer substrate given in any of claims 3-5 characterized by preparing opening which can pass a heating means in the circuit boards and the prepreg sheets other than the layer to paste up, moving a glue line to them one by one, and pasting them after piling up a circuit board group and two or more prepreg sheet groups, when carrying out heating pressurization of the part of arbitration partially they are.
[Claim 15] The manufacture approach of a multilayer substrate given in any of claims 1-5 characterized by pasting up pressurizing the field which removed at least the whole surface or a specification part when carrying out heating pressurization of the part of arbitration partially after piling up a circuit board group and two or more prepreg sheet groups, or after putting a metallic foil for a circuit board group and a prepreg sheet group on the two or more sheet pile outermost side they are.
[Claim 16] The manufacture approach of a multilayer substrate given in any of claims 1-5 characterized by removing the metallic foil like jointing of the circuit board they are.
[Claim 17] The manufacture approach of a multilayer substrate given in any of claims 1-5 which carry

out heating pressurization of the part of arbitration partially, and are characterized by for whenever [stoving temperature] being 150 degrees C or more, and a pressure being two or more [5g //cm] in the process which carries out adhesion immobilization they are.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The process sectional view showing the manufacture approach of the multilayer substrate in the 1st example of this invention
[Drawing 2] The explanatory view of the circuit pattern of the double-sided circuit board like prepreg sheet jointing in this example
[Drawing 3] The process sectional view showing the manufacture approach of the multilayer substrate in the 2nd example of this invention
[Drawing 4] The process sectional view showing the manufacture approach of the multilayer substrate in the 3rd example of this invention
[Drawing 5] The process sectional view showing the manufacture approach of the multilayer substrate in the 4th example of this invention
[Drawing 6] The top view showing the opening configuration like jointing of the prepreg sheet in this example, and the double-sided circuit board
[Drawing 7] The process sectional view showing the manufacture approach of the multilayer substrate in the 5th example of this invention
[Drawing 8] The process sectional view of the manufacture approach of the conventional double-sided circuit board
[Drawing 9] The process sectional view showing the manufacture approach of a multilayer substrate
[Description of Notations]
1a, 1b Aramid-epoxy sheet (prepreg sheet)
2 Conductive Paste
3 Tooling Holes
4 Metallic Foil
5 Heater Chip
6 Gage Pin
7 Positioning Plate
8 Depression like Jointing
10 Double-sided Circuit Board
11a, 11b, 12a, 12b Circuit pattern

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